0.2 µl - 1000 µl

0.5 ml - 1000 ml

1 ml - 10 ml

Product Description:

The pipettes are continuously adjustable, general purpose micropipettes for sampling and dispensing accurate liquid volume.

It operates on air displacement principal (i.e. an air interface is present between the piston and liquid) and uses a detachable, disposable tip. Desired volume is determined by the following formula.

$V = pr^2 h$

where
v = desired volume
r = radius
h = vertical distance traveled by the plunger.
Nine Models cover a range from 0.2 µl to 10µl.

Digital Display:

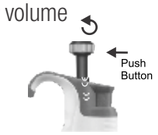
The adjustable volume micropipettes are filled with easy to read digital display.

Raw Material:

The pipette are made of mechanically durable and autoclavable materials

Pipette Operation:

Setting the delivery volume
1. Set the delivery volume using the pushbutton on the top of the pipette.



To increase the delivery volume, turn the push button counter clockwise
To decrease the delivery volume, turn it clockwise,
2. Make sure that the desired delivery click in to place.
3. Do not set volume outside the pipette's specified volume range.

Using excessive force to turn the push button out side the range may jam the mechanism and eventually damage the pipette.

Tip Ejection:

Ejector Botton

Each pipette is fitted with a tip ejector.
This helps to eliminate the risk of contamination.
To eject the tip, point the pipette at suitable waste receptacle and press the ejector button with your thumb.

Pipetting Techniques:

Push and release the push button slowly at all time particullary when working with high viscosity liquids. Never allow the push button to snap back, make sure that the tip is firmly attached to the tip cone. Check for foreign particles in the tip. Before you begin your actual pipetting work, fill and empty the tip 2-3 times with the solution that you will be pipetting. Hold the pipette in an upright position while aspirating liquid. The grippy should rest on your index finger. Make sure that the tips, pipette and solution are at the same temperature.

Forward Technique:

Fill a clean reagent reservoir with the liquid to be dispensed.
1. Depress the push button to the first stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm. and slowly release the push button .
Withdraw the tip from the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the liquid by gently depressing the push button to the first stop. After a delay of about one second stop. this action will empty the tip.
4. Release the push button to the ready position. If necessary change the tip and continue pipetting.

Reverse Technique:

The reverse technique is suitable for dispensing liquids that have a high viscosity or a tendency to foam easily. The technique is also recommended for dispensing very small volume. Fill a clean reagent reservoir with the liquid to be dispensed.
1. Depress the push button all the way to the second stop.
2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm. and slowly release the push button. Withdraw the tip form the liquid touching it against the edge of the reservoir to remove excess liquid.
3. Deliver the liquid by gently depressing the push button to the first stop. After a delay of about one second, continue to depress the push button all the way to the second stop. This action will empty the tip.
4. The remaining liquid should either be discarded with the tip or pipetted back in to the container to be dispensed.
1. Depress the push button all the way to the second stop.

Repetitive Technique

The repetitive technique offers a rapid and simple procedure for repeated delivery of the same volume.

Fill a clean regent reservoir with the liquid to be dispensed.
1. Depress the push button all the

way to the second stop.

2. Dip the tip under the surface of the liquid in the reservoir to a depth of about 1 cm. and slowly release the push button. This action will fill the tip. Withdraw the tip from the liquid touching against the edge of the reservoir to remove excess liquid.

3. Deliver the preset volume by gently depressing the push button to the first stop.
Hold the push button at the first stop. Some liquid will remain in the tip and this should not be included in the delivery.
4. Continue pipetting by repeating step 3 and 4.

Pipetting of hetrogeneous samples

(deproteinization in blood glucose determination, for example)

Use steps 1 and 2 of the forward technique to fill the tip with blood. Wipe the tip carefully with a dry clean tissue.

1. Immerse the tip into the reagent and depress the push button to the first stop. making sure the tip is well below the surface.
2. Release the push button slowly to the ready position. This will fill the tip. Keep the tip in the solution. First stop and release slowly. Keep repeating this procedure until the interior wall of the tip is clear.
4. Finally, depress the push button all the way to completely empty the tip.

Calibration and adjustment

All the pipettes are factory calibrated

and adjusted to give the volume as specified with distilled or deionized water using the forward pipetting technique.

It should be noted that the use of other pipetting techniques may affect the calibration results. The pipettes are constructed to permit re-adjustment for other pipetting techniques or liquids of different temperature and viscosity.

Device requirements and test conditions

An analytical balance must be used. The scale graduation value of the balance should be chosen according to the selected test volume of pipette.

Volume Range Readable

Graduation under 10 µl	0.001 mg
100 µl	0.01 mg
above100 µl	0.1 mg

Test liquid Water, distilled or deionized "grade 3" water conforming ISO 3696. Tests are done in a draft-free room at a constant (±0.5°C) temperature of water pipette and air between 15°C to 30°C. The relative humidity must be above 50% . Especially with volumes under 50 µl, the air humidity should be as high as possible to reduce the effect of evaporation trap are recommended.

Procedure

1. Do 10 Pipetting with the minimum volume.
2. Do 10 Pipetting with the maximum volume.
3. Calculate the inaccuracy (A) and imprecision (cv) of both series.
4. Compare the result to the limits in

the Table 1.

If the calculated results within the selected limits. The adjustments of pipette is correct adjustment

Range	Volume	Inaccuracy		Imprecision	
	µl	±%	µl	cv±%	µl
0.2 µl - 2 µl	2	2	.04	1.2	0.024
0.5 µl - 10 µl	10	1	0.1	0.5	0.05
2 µl - 20 µl	20	0.8	0.16	0.4	0.08
5 µl- 50 µl	50	0.8	0.4	0.4	0.2
10 µl - 100 µl	100	0.6	0.6	0.2	0.2
20 µl- 200 µl	200	0.6	1.2	0.2	0.4
100 µl- 1 ml	1000	0.6	6	0.2	2
0.5 ml - 5 mll	5000	0.6	30	0.2	10
1 ml -10 ml	10000	0.6	60	0.2	20

Fixed Volume	Inaccuracy		Imprecision	
µl	±%	µl	cv±%	µl
5	2	0.1	1	0.05
10	1	0.1	0.5	0.05
20	0.8	0.16	0.4	0.08
25	0.8	0.2	0.4	0.1
50	0.8	0.4	0.4	0.2
100	0.6	0.6	0.2	0.2
200	0.6	1.2	0.2	0.4
500	0.6	3	0.2	1
1000	0.6	6	0.2	2
2000	0.6	12	0.2	4
5000	0.6	30	0.2	10
10000	0.4	40	0.2	20

Adjustment

Adjustment is done with the service tool.
1. Place the service tool into the openings of the calibration nut at the top of the handle.
2. Turn the service tool clockwise to increase, or counter clockwise to decrease the volume.
3. After adjustment check the calibration according to the Instructions above.

Formula for calculating results
conversion of mass to volume
V= (w+e) x Z
v = volume (µl)
w= weight (mg)
e= evaporation loss (mg)
z=conversion factor for µl/mg conversion
Evaporation loss can be significant with low volume. To determine mass loss. Dispense water to the weighing vessel, note the reading and start a stopwatch. See how much the reading decreases during 30 seconds.
(i.e. 6mg=0.2 mg/s)
Compare this to the pipetting time from taring to reading, typically pipetting time might be 10 seconds and the mass loss is 2 mg (10s x 0.2 mg/s) in this example . If an evaporation trap or lid on the vessel is used the correction of evaporation is usually unnecessary. The factor Z is for converting the weight of the water to value is 1.0032 µl/mg at 22°C and 95 kPa. See conversion table below.

Temperature °C	Air pressure kPa						
	80	85	90	95	100	101.3	105
15.0	1.0017	1.0018	1.0019	1.0019	1.0020	1.0020	1.0020
15.5	1.0018	1.0019	1.0019	1.0020	1.0020	1.0020	1.0021
16.0	1.0019	1.0020	1.0020	1.0021	1.0021	1.0021	1.0022
16.5	1.0020	1.0020	1.0021	1.0021	1.0022	1.0022	1.0022
17.0	1.0021	1.0022	1.0022	1.0022	1.0023	1.0023	1.0023
17.5	1.0022	1.0022	1.0023	1.0023	1.0024	1.0024	1.0024
18.0	1.0022	1.0023	1.0023	1.0024	1.0025	1.0025	1.0025
18.5	1.0023	1.0024	1.0024	1.0025	1.0025	1.0026	1.0026
19.0	1.0024	1.0025	1.0025	1.0026	1.0026	1.0027	1.0027
19.5	1.0025	1.0026	1.0026	1.0027	1.0027	1.0028	1.0028
20.0	1.0026	1.0027	1.0027	1.0028	1.0028	1.0029	1.0029
20.5	1.0027	1.0028	1.0028	1.0029	1.0029	1.0030	1.0030
21.0	1.0028	1.0029	1.0029	1.0030	1.0031	1.0031	1.0031
21.5	1.0030	1.0031	1.0031	1.0031	1.0032	1.0032	1.0032
22.0	1.0031	1.0032	1.0032	1.0032	1.0033	1.0033	1.0033
22.5	1.0032	1.0033	1.0033	1.0033	1.0034	1.0034	1.0034
23.0	1.0033	1.0034	1.0034	1.0034	1.0035	1.0035	1.0036
23.5	1.0034	1.0035	1.0035	1.0036	1.0036	1.0036	1.0037
24.0	1.0035	1.0036	1.0036	1.0037	1.0037	1.0038	1.0038
24.5	1.0037	1.0038	1.0038	1.0038	1.0039	1.0039	1.0039
25.0	1.0038	1.0039	1.0039	1.0039	1.0040	1.0040	1.0040
25.5	1.0039	1.0040	1.0040	1.0041	1.0041	1.0041	1.0042
26.0	1.0040	1.0041	1.0041	1.0042	1.0042	1.0043	1.0043
26.5	1.0042	1.0043	1.0043	1.0043	1.0044	1.0044	1.0044
27.0	1.0043	4.0044	4.0044	4.0045	4.0045	4.0045	4.0046
27.5	4.0045	1.0046	1.0046	1.0046	1.0047	1.0047	1.0047
28.0	1.0046	1.0047	1.0047	1.0047	1.0048	1.0048	1.0048
28.5	1.0048	1.0048	1.0048	1.0049	1.0049	1.0050	1.0050
29.0	1.0049	1.0050	1.0050	1.0050	1.0051	1.0051	1.0051
29.5	1.0051	1.0051	1.0051	1.0052	1.0052	1.0052	1.0052
30.0	1.0052	1.0053	1.0053	1.0053	1.0054	1.0054	1.0054

Inaccuracy (systematic error):

Inacccuracy is the difference between the dispensed volume and the selected volume of a pipette.
$A = \overline{V} - V_o$
A = inaccuracy
$\overline{V}$ = mean volume
V_o = normal volume
Inaccuracy can be expressed as a relative value A%= 100% x A/V°
imprecision (random error)
Imprecision refers to the repeatability of the pipetting. It is expressed as standard deviation (s) or coefficient of variation (cv)

$$s = \sqrt{\frac{\sum_{i=1}^{n} (V_i - \overline{V})^2}{n-1}}$$

s= standard deviation

v= mean volume
n= number of measurment
Standard deviation can be expressed as a relative value (cv)
CV = 100% x S/V

Maintenance:

When pipette is not in use, make sure it is stored in an upright position. We recommend a stand for this purpose .

Short term service:

The Pipette should be checked at the begining of each day for dust and dirt on the outside surface of the pipette. Particular attention should be paid to tip cone. No other solvents except 70% ethanol should be used to clean the pipette.

Long Term Service Single Channel Pipette:

If pipette is used daily it should be checked every three month. The servicing procedure starts with the disassembly of the pipette.

1. Press the tip ejector button and pull the tip ejector out (fig. 1)
2. Turn the tip cone counter clockwise to unscrew (fig.2).
3. Fix the service tool on the O-ring seat and turn clockwise to open. P ull out the O-ring seat and turn the tip cone upside down and retreive the O-ring.
4. Clean the tip cone for foreign particles.
5. Grease the cleaned parts with lubricant preferably silicon grease.

Reassembly:

For range 0.2-2 µl, 0.5-10µl, 5-10µl 5-50 µl, 10-100µl, 20-200µl.
• Place the O-ring in the tip cone and screw the O-ring seat with help of service tool.
• Place the spring on the piston and slide inside the tip cone.
• Screw the assembled tip cone in the main housing.
• Slide the tip ejector on the tip cone.
• Turn the tip ejector clockwise while forcing the ejector panel downwards.

Dis-assembly:

For 0.5-5µl, 1-10ml pull the lower position of the ejector to dis-engage from the upper portion.
Unscrew the tipcone from the main housing.
The tip cone is in two portion, the lower portion can be unscrewed from the upper portion to expose the piston. (fig.12)

Sterlization:

The entire pipette can be sterlized by autoclaving it at 121°C(252°F)(2ata) (minimum 20 minutes) No special preperation are needed for autoclaving. You can use stream sterlization bags if nedded.

After autoclaving, the pipette must be cooled to room temperature for at least two hours. Before pipetting, make sure that pipette is dry. We recommend that you check the calibration after every sterlization cycle to achieve the best possible accuracy.

Trouble shooting:

The table below lists possible problem and thier solutions.

Defect	Possible reason	Solution
Leakage	Tip incorrectly attached Foreign particles between tip and tip cone Foreign particles between the piston, the o-ring and the cylinder Insufficient amount of grease on cylinder and o-ring, O-ring Damaged	Attach firmly Clean tip cones attach new tip Clean and grease O-ring and Cylinder Grease accordingly Change the O-ring
Inaccurate dispensing	Incorrect operation Tip incorrectly attached calibration altered caused misuse,for examples	Follow instruction carefully attach firmly Recalibration according to instructions
Inaccurate dispensing with certain liquids	Unsuitable calibration High viscosity liquids may require recalibration	Recalibration with the liquids in quistion

Package:

The Pipette is shiped in a specially designed package containing the following items.
1. Service Tool
2. Tip Sample
3. Instruction Manual
4. Calibration Certificate
5. Shelf Hanger

Caution:

The Pipette is designed to allow easy in-lab service. If you would prefer to have us or your local representative service your pipette, please make sure that the pipette has been decontaminated before you send it to us. Please note that the postal authorities in your country may prohibit or restrict the shipment of contaminated material by mail.

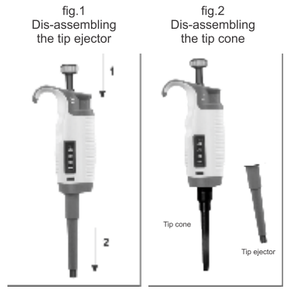


fig.1
Dis-assembling the tip ejector

fig.2
Dis-assembling the tip cone

fig.3
Dis-assembling the piston


fig.3 a
Dis-assembling the piston


fig. 4
Service Tool


fig. 5
Dis-assembling the O-ring seat


fig. 6
O-ring Seat & Service tool


fig. 7
Piston & Spring


fig.8


fig.9


fig.10


fig.11


fig.12

Operation Manual
MICROPIPETTE